DOCUMENT RESUME

ED 255 740 CE 041 276

AUTHOR	Lewis, Morgan; And Others
TITLE	Future Influences on Vocational Education. Special Publication Series No. 46.
INSTITUTION	Ohio State Univ., Columbus. National Center for Research in Vocational Education.
SPONS AGENCY	Office of Vocational and Adult Education (ED), Washington, DC.
PUB DATE	[85]
CONTRACT	300-83-0016
NOTE	25p.; For related documents, see ED 240 269 and ED 245 061. Printed on colored paper.
AVAILABLE FROM	National Center Publications, Box F, National Center for Research in Vocational Education, 1960 Kenny Road, Columbus, OH 43210-1090 (SN46--$2.75).
PUB TYPE	Information Analyses (070)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	Automation; Business Cycles; *Economic Climate; Educational Finance; Educational Planning; Educational Policy; *Enrollment; Federal Government; *Futures (of Society); Labor Force; *Population Trends; Postsecondary Education; Robotics; Secondary Education; *Technological Advancement; *Vocational Education
IDENTIFIERS	Office Automation

ABSTRACT

This booklet provides a brief overview of some of the major trends most likely to influence vocational education during the remainder of the 1980s. It is directed to all vocational educators, particularly planners and policymakers, who want a better understanding of the conditions under which their programs will operate. It considers the nation's economic and political climate, including these influences on the dollars available for vocational education: the stability of the dollar, phases of the business cycle, and competing demands for public funds. The impact of technology, especially robotics and office automation, is surveyed. Demographic changes in the population and labor force to which vocational education must adapt are examined, and job growth and openings are projected. Trends in enrollments and funding for vocational education are then summarized. Finally, these implications for vocational education are advanced: shifts in curriculum emphasis, changes in instructional methods, and the redirection of vocational education and of the content of jobs due to increasing advances in new technology. (YLB)

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Future Influences on Vocational Education

Special Publication Series No. 46

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FOREWORD

This booklet provides a brief overview of some of the major trends most likely to influence vocational education during the remainder of the 1980s.

It is directed to all vocational educators, particularly planners and policy-makers, who want a better understanding of the conditions under which their programs will operate.

This booklet is based upon two reports prepared at the National Center for Research in Vocational Education with support from the Office of Vocational and Adult Education, U.S. Department of Education: *Anticipating Future Influences on Vocational Education* and *Robotics and Office Automation: Implications for Vocational Education*. The full reports of these studies have been submitted to the ERIC Clearinghouse on Adult, Career, and Vocational Education at the National Center. For availability information, contact the National Center's ERIC acquisitions coordinator at 614-486-3655 or 800-848-4815 (toll free outside Ohio).

This overview was developed by staff from the Evaluation and Policy Division, directed by N. L. McCaslin, and from the Personnel Development and Field Services Division, directed by Lucy Thrane. Those most responsible were Morgan Lewis, Jeannette Fraser, Paul Unger, Dennis Mathias, and Rod Spain. A preliminary draft was reviewed by Joseph F. Coates, President, J. F. Coates, Inc., Washington, DC and Robert C. Harris, Advisor to the President, Indiana University, Bloomington, Indiana. Judy Balogh conducted the final edit and Sherri Trayser was the word processor operator.

Robert E. Taylor
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INTRODUCTION

Virtually every indicator suggests that the remaining years of the 20th century will be a period of rapid change. Efforts to increase the competitiveness of American products in international markets and the widespread application of computers in production processes and communications should result in unprecedented rates of technological change. These changes will affect the skills needed in the labor force and the training that should be provided for these skills.

Society will also have to adjust to the aging of the population and to reduced numbers of entry-level workers. Vocational educators must respond to these developments, and need information enabling them to anticipate the changes and the types of responses that are appropriate.

In such a period of transition, it is difficult to know how best to prepare young people and to retrain adults for rewarding employment in a future whose structure can only be dimly perceived. As difficult as the task is, planners and policymakers must make decisions based on the best available information. This report is designed to assist in this decision-making process.

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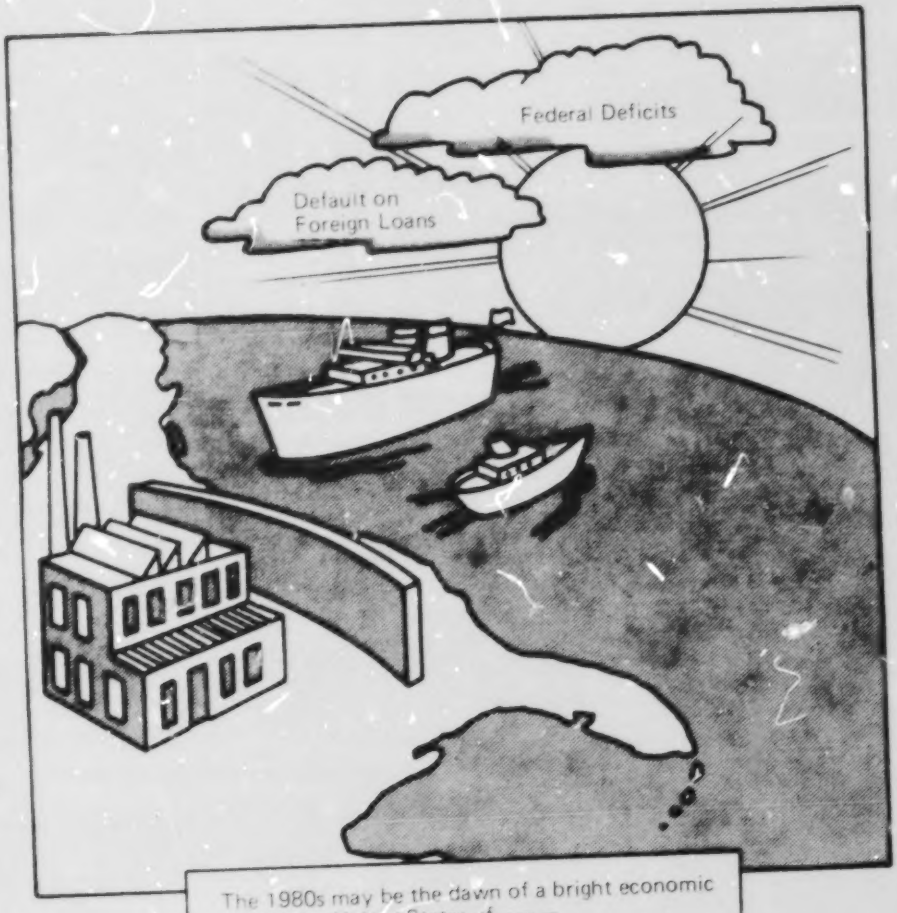

The 1980s may be the dawn of a bright economic era for the United States, if— — —

- budget deficits are controlled
- foreign countries do not default on loans
- foreign trade imbalances are overcome
- protectionist policies are avoided

THE NATIONAL CLIMATE

The Nation's economic and political climate influences the delivery of vocational education. The stability of the dollar, phases of the business cycle, and competing demands for public funds all affect the dollars available for vocational education. In addition, the emphases of federal legislative policies directly affect who and what is taught in vocational education.

The United States's economic position weakened in the early 1970s. Several interrelated factors contributed to this relative weakening.

- After World War II, while Europe and Japan were rebuilding their industries with new equipment, the United States followed business and labor practices that hampered our ability to compete successfully in many international markets.
- After 1973, the rising cost of oil contributed to domestic inflation and the flow of dollars to oil producing countries.
- U.S. trade policy, rather than encouraging competition and the changing configuration in the manufacturing industries, has responded by establishing protectionist import policies and subsidies to dying industries.

Several business indexes are predicting that the current expansion in the economy will begin to slow.

- The real gross national product is expected to grow at an annual rate of 6.1 percent in the first quarter of 1984, and drop to 3.2 percent by the end of the year.
- Inflation is expected to remain at moderate levels while the foreign trade deficit remains the major drag on economic growth.
- In the next 6 to 12 months, the dollar will decline in value, easing some pressures on U.S. exports.
- Unless the unprecedented increases in the federal budget deficit can be controlled, the economy is likely to worsen considerably in 1985.

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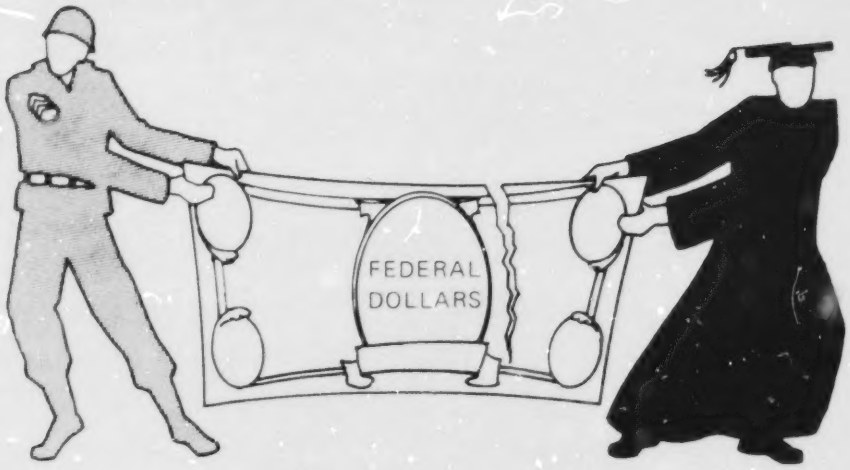

Defense and education are two of the few "controllable" items in the federal budget. Many other expenditures such as Social Security, Medicare, Welfare, and Veterans Benefits are entitlements guaranteed by law.

The Reagan Administration has clearly placed a high priority on strengthening our current levels of defense preparedness:

- In 1982, 6.1 percent of the gross national product was devoted to defense, the largest percentage since 1972 when the Vietnam War was winding down.
- Strengthening the skills of individuals in the military, as well as those employed by defense suppliers, is critical to the defense goals of the Nation.
- The U.S. Departments of Defense and Education are encouraging cooperation between defense firms and vocational education.
- Increasing national defense expenditures will require more skilled workers in defense-related industries.
- With several agencies competing for limited federal dollars, education may well be at a disadvantage when compared to the needs of the military.

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Present economic and political activities signal several trends for the near future that are likely to affect vocational education.

- The United States must continue to strive for competitiveness in world markets.
- The Federal Government will be hesitant to increase funding for domestic programs. The large increase in the defense budget to improve our national security has limited the funds available for education and many other social programs.
- Congress views serving special needs populations as one of the primary federal roles of vocational education. Vocational education should upgrade and retrain displaced workers as well as serve groups who have special problems obtaining satisfactory employment. These areas of concern will continue to influence federal vocational education legislation in the future.
- A stronger emphasis on scholastic programs at the secondary level will cause students to study more mathematics, science, and language. With less opportunity to study vocational skills at the secondary level, more students are likely to obtain occupational preparation in community colleges and technical institutes after high school.

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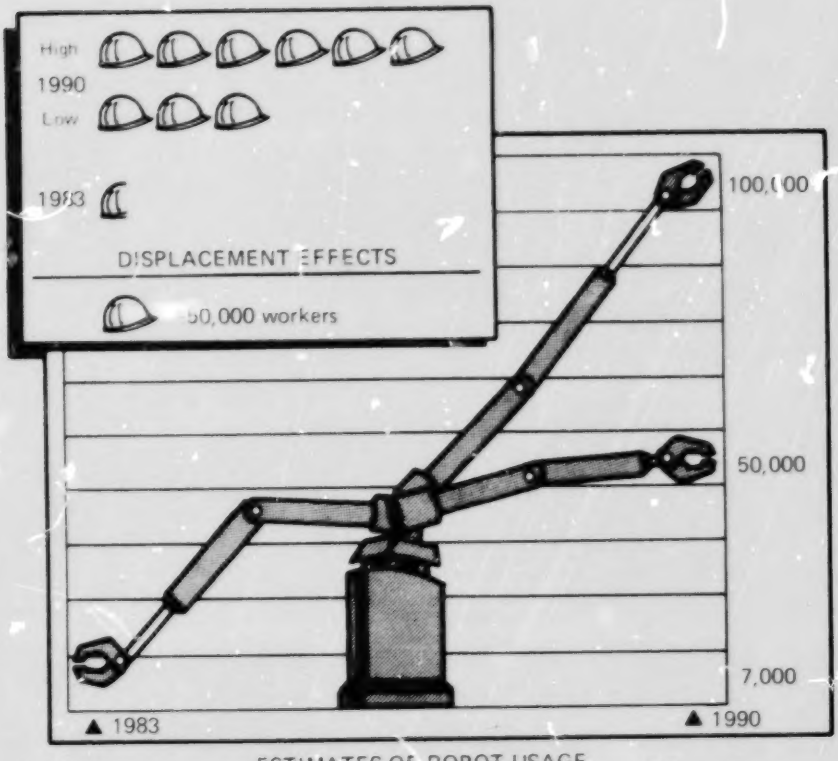

ESTIMATES OF ROBOT USAGE

Industrial robots are projected to increase from a total of about 7,000 in 1983 to between 50,000 to 100,000 in 1990. Generally, each robot replaces three workers.

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THE IMPACT OF TECHNOLOGY

The 1980s are a time of rapid technological change. Technological inroads have been forged in four major fields: biomedical/genetics, energy, information technologies, and manufacturing processing. Changes in the skills needed in the work force due to office automation (information technology) and robotics (manufacturing processes) are expected to create training opportunities for vocational education, but not to the extent some forecasters anticipate.

Robotics

- In 1983, 5,000 to 7,000 robots were in use in the United States; projections of robot usage in 1990 range from 50,000 to 100,000.
- Generally, one robot replaces three workers.
- Not all displaced workers lose their jobs; many are retrained or transferred.
- During the remainder of the 1980s, little demand is expected for newly trained robotics technicians.
- Four major factors will affect the rate of adoption of robots in industry:
  - Price of labor versus capital available to be invested in equipment
  - Cost of equipment
  - Interfacing capabilities of automated equipment
  - the next several years
- their decision about offering programs for robotics technicians.

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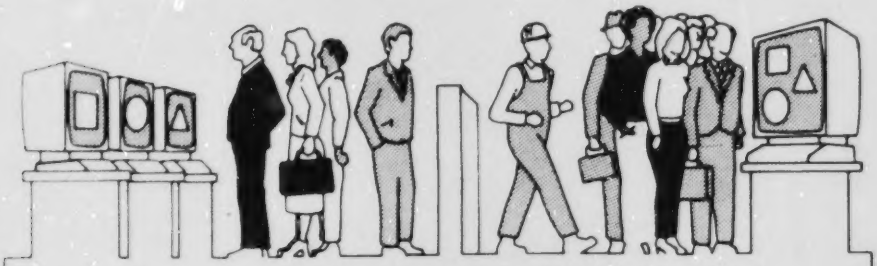
Office Automation

- Office automation equipment changes rapidly.
  - Currently, the move is away from *stand alone* (unifunctional) to *integrated* (multifunctional) word processing systems due to (1) cost reduction in use of multifunctional systems, and (2) increased efficiency and capability between equipment.
  - Today employers find an influx of personal computers into the office due to (1) multifunction operational capability, (2) reduction in cost, and (3) interfacing capability.



Offices are just beginning to be affected by advances in information and communications technologies. By the end of the decade, most office jobs and many skilled trades will require a basic knowledge of computers.

- Several factors influence the diffusion of office equipment.
  - Lack of standardization of office automation equipment
  - Cost of equipment
  - Technological advancements
  - Capital investment required to convert to an automated office

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- Shortage of qualified personnel
- Reductions in corporate training budgets

- Office automation will not cause a major decrease in the demand for secretaries.
- Traditionally, word processing training has been conducted by experienced personnel in individual firms. With reductions in office automation training budgets, new sources of training must be sought.
- Word processing operators in the future will need skill training in basic computer literacy, higher order analysis (including comprehension and logical thinking), in addition to keyboard skill training.

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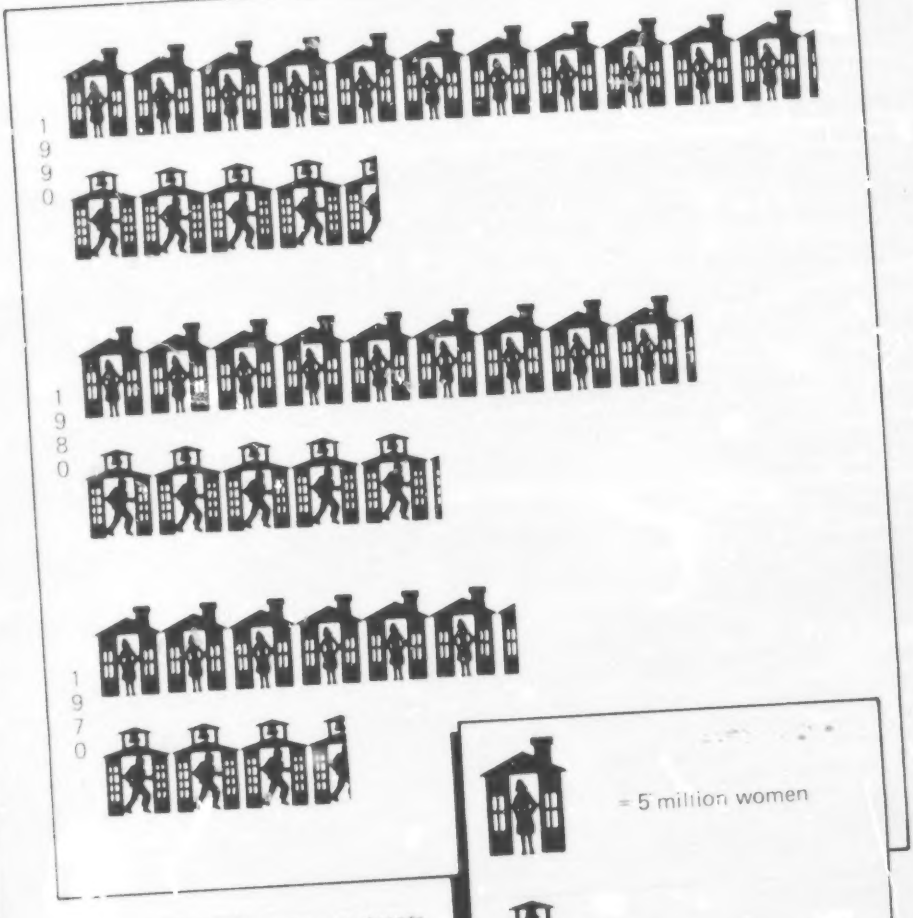
LABOR FORCE DISTRIBUTION OF YOUTH AND WOMEN



There will be fewer new entrants to the labor market in the next 10 years. Women will contiue to represent a growing percentage of the labor force in the future.

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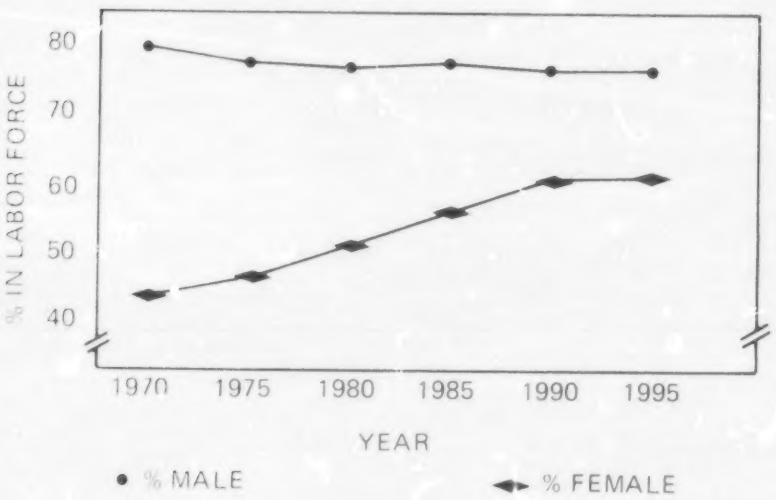
LABOR FORCE

Vocational education must adapt to the demographic changes in the population and the labor force.

The age, sex, and minority representation of future vocational students and the composition of the future labor force will change:

- Vocational education will serve fewer young people who are 14 to 24 years old. Fewer young workers will enter the labor force.
- Because of higher birth rates in racial/ethnic minority groups, there will be larger proportions of minority group young people in the high school—postsecondary age ranges.
- In 1970, 38 percent of the nation's labor force was female; 42 percent was female in 1980, and 46 percent is projected by 1990.
- In 1970, 43 percent of all women living in the United States over age 16 were participating in the labor force; 52 percent participated in 1980, and approximately 60 percent participation is projected by 1990.



LABOR FORCE PARTICIPATION RATES BY SEX, BY YEAR

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Job Growth and Openings

Total civilian employment is projected to increase 25 percent from 1982 to 1995, from a total of 102 million to 128 million workers. Industrial demand for these workers will vary.

- The major source of job openings will be replacement of workers in existing jobs, not growth of new jobs.
- Service industries will be the main source of the employment increases.
- The proportion of the work force in manufacturing will remain stable.
- High-technology industries will grow faster than average without, however, being a major source of employment opportunities in the 1980s.
- Retail sales workers have the highest projected average annual job openings from 1980 to 1990.
- Auto workers will experience the heaviest displacement due to robotics.

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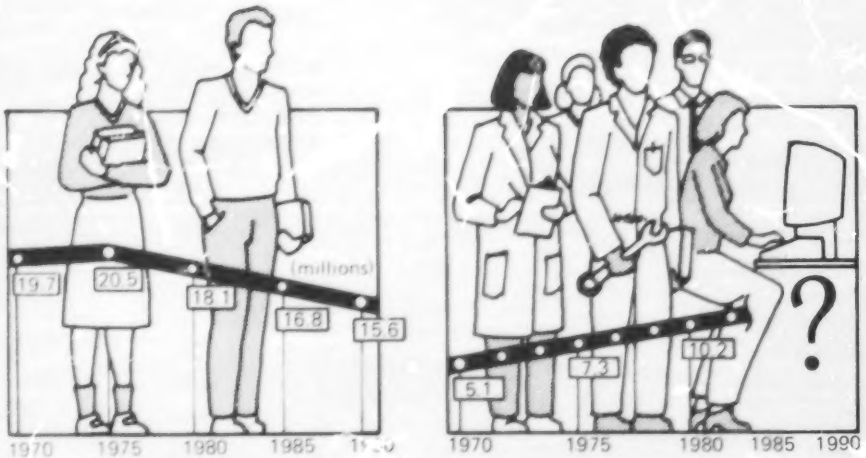
TRENDS WITHIN VOCATIONAL EDUCATION

Enrollments and funding for vocational programs increased steadily over the past decade. At the secondary level, vocational education enrollments increased throughout the 1970s despite the decline in the total number of secondary students after 1975. Most of the increase in funding came from state and local sources, as federal funding remained almost constant.

SECONDARY SCHOOL ENROLLMENT



Secondary school enrollments reached a peak in 1975 and are projected to decline until the mid 1990s. Enrollments in secondary vocational education increased throughout the 1970s. Continued increases seem unlikely in the 1980s.

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These changes will have a direct effect on vocational education.

- Secondary school students will decline by 2.5 million between 1980 and 1990.
- In the future, potential for increasing cooperative enrollments seems to exist.
- Total expenditures for education have more than doubled during the period 1969-1981, increasing from $70 billion to an estimated $200 billion.
- After peaking in 1975 at 8 percent, total expenditures for education have slowly decreased to an estimated 6.8 percent of the gross national product in 1981.
- Vocational education expenditures as a percentage of total education expenditures increased during the 1970s from 3.2 percent in school year 1971-72 to 4.1 percent in school year 1979-80.

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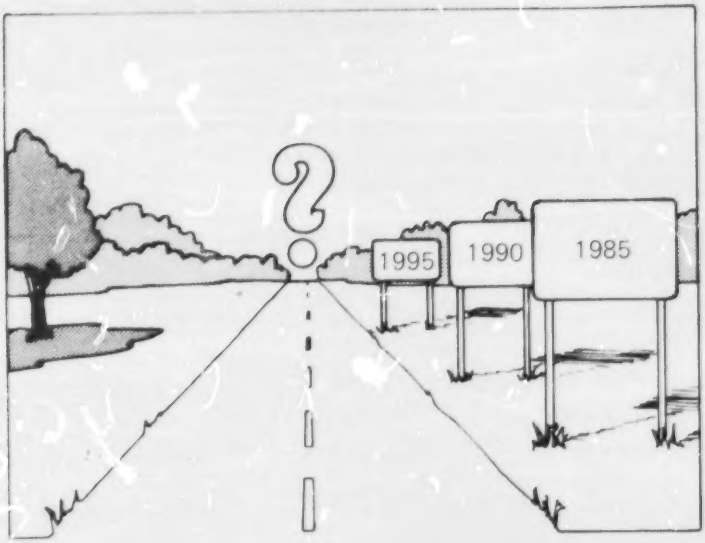

IMPLICATIONS FOR VOCATIONAL EDUCATION

Societal, economic, and labor force trends will directly affect vocational education. Vocational leaders, in an attempt to maintain a quality education for vocational students, will have to adjust their programs to accommodate the coming changes. Most directly affected by these trends will be courses that students choose to study, how instruction is delivered, and equipment needed in the classrooms.

Shifts in curriculum emphasis will occur at all educational levels:

- Communication, computation, and science skills will receive more emphasis in secondary schools, leaving less time for vocational courses.
- Specific occupational skills are likely to receive less emphasis at the secondary level.
- More occupational training will be obtained at the postsecondary level.
- Upgrading and retraining workers will receive additional emphasis, particularly at the postsecondary level.

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Instructional methods at both the secondary and postsecondary levels will change.

- The mode of instructional delivery will shift. Instructors will move from being deliverers of information to managers of learning as a result of the increased use of electronic instructional equipment.

- Learning may take place in more diverse settings. Community and employment centers will serve as satellite schools, particularly for established workers seeking upgraded skills.

The increasing advances in new technology will redirect vocational education and the content of jobs.

- High equipment costs and rapid technological advances will require more participation from employers for vocational student training. The difficulty for vocational schools keeping equipment up to date, linked with the difficulty of industry finding workers trained to operate this equipment, will force a new alliance between vocational education and industry.

- Although technological change will be rapid, it will affect jobs in an evolutionary rather than revolutionary way. Changes will take place gradually, modifying existing jobs. Only occasionally will completely new jobs emerge.

The coming years will place many demands on vocational education. It will be called upon to conduct traditional entry-level instruction, to help ensure that students have basic communication and computational skills, to play an expanded role in training the disadvantaged, and to retrain and upgrade more adult workers than ever before.

At the same time, vocational education will be called upon once again to justify its claim as a legitimate component of secondary education. The challenges are many, and many program adjustments will be needed. Nevertheless, the broad support that vocational education receives from students, parents, employers, school board members, and legislators indicates it has served a wide variety of needs in the past and it can continue to do so in the future.

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FUNDING INFORMATION

Project Title:	National Center for Research in Vocational Education, Dissemination and Utilization Function
Contract Number:	300830016
Project Numbers:	0510C40060/0510C40061
Educational Act Under Which Funds Were Administered:	Education Amendments of 1976, P.L. 94-482
Source of Contract:	Office of Vocational and Adult Education U.S. Department of Education Washington, D.C. 20202
Contractor:	The National Center for Research in Vocational Education The Ohio State University Columbus, Ohio 43210
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